(12) UK Patent Application (19) GB (11) 2 168 078 A

(43) Application published 11 Jun 1986

(21) Application No 8528375

(22) Date of filing 18 Nov 1985

(30) Priority data

(31) 8429080 (32) 16 Nov 1984 (33) GB

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(51) INT CL[4]
C22C 9/02

(52) Domestic classification (Edition H):
C7A 712 B249 B279 B289 B309 B319 B32X B32Y B349 B369 B37Y B389 B399 B419 B439 B449 B44Y B489 B50Y B519 B528 B52X B52Y B531 B533 B539 B53X B549 B559 B610 B613 B616 B619 B621 B624 B627 B62X B62Y B630 B635 B63Y B661 B663 B665 B666 B669 B66X B670

(56) Documents cited
GB 1385191 US 3674471

(58) Field of search
C7A
Selected US specifications from IPC sub-class C22C

(54) Brazing alloy

(57) A brazing alloy which comprises copper, phosphorus and tin to which has been added a component which prevents the formation of a sheet of brittle phosphides when used with mild steel. The component for preventing the formation of a sheet of phosphide is a Group VIIA or VIIIA metal, preferably nickel.

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SPECIFICATION

Brazing alloy

This invention relates to an alloy, in particular to an alloy suitable for brazing metals such as mild steel.

Brazing is the joining of two pieces of metal by fusing a third metal. The temperatures involved are generally in excess of 450°C (below this the process is referred to as soldering), and a typical brazing operation employing brass as the filler metal will require temperatures in the order of 950°C.

So-called "silver solder" is in fact a brazing alloy for joining, e.g., mild steel, with an application temperature in the region of 650 - 700°, but is relatively expensive. Other low temperature brazing alloys are available, for example the Cu-P-Sn system. These also operate in the region of 650 - 700°, but are not suitable for joining articles of mild steel sinc the joints are too brittle and lack the necessary strength.

The invention seeks to provide a low-temperature brazing alloy less expensive than silver solder and which can be used to join mild steel.

According to the present invention there provided a brazing alloy which comprises copper, phosphorus and tin to which has been added a component which prevents the formation of a sheet of brittle phosphides when used with mild steel.

It has been found that the low strength of mild steel joints produced with conventional Cu-P-Sn alloys is due to formation of a sheet of brittle phosphides in the joint. The addition of a component which prevents the formation of this brittle sheet, or causes the phosphides to be formed in a discontinuous manner, greatly increase the strength of joints.

The preferred component for preventing the formation of a sheet of phosphide is nickel, but other Group VIIA and VIIIA metals may also be employed. The amount of component employed may be varied through fairly wide limits, from 2% through to 22% or more, although for most purposes from 4 to 20% will be used. In the lower ranges, e.g. from 4 to 15% a useful increase in strength is obtained at temperatures around 700°C. Amounts above 15% Ni give even greater strengths of joint but may require higher brazing temperatures.

The base alloy may be any of the conventionally used Cu-P-Sn brazing systems currently available. The alloy of the invention is preferably formulated as a paste for convenience in brazing applications, and moreover we have found that at least in some end-uses formulation as a paste allows results to be achieved which are not possible with wires, foils or the like. A typical paste formulation would have about 70% alloy in an organic binder, typically a suspension, usually with a flux.

In a particular Example a standard brazing alloy of the composition 7.1% P, 5.6% Sn, 87.3% Cu was made up with the following amounts of nickel, and organic binders suitable for torch brazing. Six mm × 25mm single lap specimens of mild steel were brazed with the alloys and tested for shear strength.

With from 4 to 15% Ni shear strengths in the region of 40 to 50 MNm^{-2} were obtained. For example, with 8% Ni the following results were obtained: 42, 43, 51, 45, 43, 54 MNm^{-2}, which is less than a similar brass braze but nevertheless useful, and of course obtained at temperatures of about 250° less than those require for brazing with brass.

Above 15% Ni causes the joint strength to increase to around 60 MNm^{-2}, but the brazing temperature may have to be raised somewhat.

The alloys of the invention provide a cheaper alternative to silver solder in the brazing of mild steels.

CLAIMS

1. A brazing alloy which comprises copper, phosphorus and tin to which has been added a component which prevents the formation of a sheet of brittle phosphides when used with mild steel.

2. An alloy as claimed in claim 1 in which the component for preventing the formation of a sheet of phosphide is a Group VIIA or VIIIA metal.

3. An alloy as claimed in claim 2 in which the metal is nickel.

4. An alloy as claimed in any of claims 1 to 3 in which the amount of component employed may be varied from 2% through to 22% or more.

5. An alloy as claimed in claim 4 in the amount of component ranges from 4 to 20%.

6. An alloy as claimed in any of claims 1 to 5 in which the base alloy is a Cu-P-Sn brazing alloy.

7. An alloy as claimed in any of claims 1 to 6 formulated as a paste.

8. An alloy as claimed in claim 7 in which the paste comprises about 70% alloy in an organic binder, with a flux.

9. An alloy according to claim 1 substantially as hereinbefore described with reference to the foregoing examples.

Printed in the UK for HMSO, D8818935, 4/86, 7102.
Published by The Patent Office, 25 Southampton Buildings, London, WC2A 1AY, from which copies may be obtained.

EUROPEAN PATENT OFFICE

Patent Abstracts of Japan

PUBLICATION NUMBER : 09070686
PUBLICATION DATE : 18-03-97

APPLICATION DATE : 06-09-95
APPLICATION NUMBER : 07229120

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INVENTOR : FURUTOKU KOICHI;

INT.CL. : B23K 35/22 B22F 9/08 B23K 35/30 B23K 35/40 C22C 9/02

TITLE : COPPER ALLOY BRAZING SHEET AND ITS PRODUCTION

ABSTRACT : PROBLEM TO BE SOLVED: To obtain a brazing sheet with which multipoint simultaneously brazing is possible and the lowering of a brazing temp. is possible and its production.

SOLUTION: This brazing sheet is formed by coating at least one surface of a core material consisting of copper or copper alloy with a brazing filler metal contg., by weight, 6 to 15% Sn, 5 to 7% Ni and 5 to 8% P and consisting of the balance Cu as a skin material. A method of forming the skin material consisting of the brazing filler metal on the surface of the core material by applying the powder of the brazing filler metal constituting the skin material in the form of a mixture mixed with an org. binder on at least one surface of the core material consisting of the copper or copper alloy, subjecting the core material to a heat treatment to evaporate and dissipate the org. binder in the coating film of the mixture and to dissolve the powder of the brazing filler metal, then cooling the core maternal is adapted.